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GAS AND/OR GAS HYDRATE IN THE NEAR-SEAFLOOR SEDIMENTS OF THE WESTERN ULLEUNG BASIN, EAST SEA

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Twenty-two piston cores 5 to 8 m in length were retrieved in the western part of the deep-water Ulleung Basin with water depth from 790 to 2174 m. They were analyzed to evaluate the potential for gas generation and gas hydrate formation, to determine the presence of gas and/or gas hydrate, and to identify the origin of organic matter and residual hydrocarbon gas in the near-seafloor sediment. Multi-channel reflection seismic (MCRS) data, Chirp profiles and echo-sounding images were additionally investigated to identify the geophysical indicators for the presence of gas and/or gas hydrate.

Sedimentation rates ranging from 168 to 190 m/10^6yr indicate a favorable condition for organic diagenesis to occur. The average contents of the total organic carbon (TOC) of the core sediments ranged from 1.25 to 1.93%. These values suggest a good condition for gas generation and gas hydrate formation (Sloan, 1998). The cores recovered from the southern study area generally revealed high concentrations of residual hydrocarbon gas (up to 87.4 ml/l of wet sediments) mainly composed of methane that would also favor the formation of gas hydrate (Sloan, 1998). The TOC/N ratios of the core sediments were mostly from 4 to 12, indicating the organic matter originated mainly from a marine source (e.g. Stein, 1991). The lack of higher hydrocarbons and core $\delta^{13}C_{CH4}$ values in the range from -78 to -75‰ indicate that their origin is primarily biogenic. The estimated sulfate methane interface (SMI) depth was ca. 6 meters below seafloor in the southern study area and deeper than cored interval in the northern study area. The variations in SMI depths would be associated with the amount of methane flux (e.g., Borowski et al., 1999). In spite of high TOC contents, the low concentrations

of residual hydrocarbon gas of the core sediments recovered in the northern study area would be related with the SMI depth as well.

In the piston cores, cracks generally oriented to bedding suggest significant gas content. A number of bottom simulating reflectors (BSRs) and vertical to sub-vertical blank zones were well observed in the MCRS sections. They may suggest the presence of gas and/or gas hydrate (e.g., Shipley et al., 1979; Judd and Hovland, 1992). Numerous pockmarks were also well identified in the Chirp profiles. Their occurrence may indicate the presence of free gas below the gas hydrate stability zone (Vogt et al., 1994). Gas seeping feature above the seafloor were observed in the echo-sounding images as well. The distribution of BSRs, blank zones and gas seeping features were generally limited to the regions, however, pockmarks occurred sporadically in the entire study area. The differences of their occurrences may be related with the methane flux and sedimentary properties.

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